

CLAIMS

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is as follows:

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a/
1. A method for transforming a digitized image, said method comprising:
providing said image as a plurality of pixels, wherein data for each pixel is in a first format; and
halftoning said data of each of said pixels by employing data from a region of interest which includes at least one pixel following said each-of-said pixels, and producing a second format for said image.
 2. A method as recited in claim 1, wherein the region of interest includes a plurality of neighboring pixels.
 3. A method as recited in claim 2, wherein the neighboring pixels form a symmetrical pixel array surrounding said each of said pixels.
 4. A method as recited in claim 3, wherein the symmetrical pixel array forms a square.
 5. A method as recited in claim 1, further comprising using said second format for an output device.

1 6. A method as recited in claim 5, wherein said output device
2 is a printer.

3 7. A method as recited in claim 1, further comprising
4 determining a dynamic range of pixel values of pixels in an
5 encompassing neighborhood of the region of interest, and
6 wherein the step of halftoning includes making dynamic
7 adjustments depending on the dynamic range of pixel values.

8 8. A method as recited in claim 7, wherein the step of making
9 dynamic adjustments includes producing a visually pleasing
10 transition between text and picture areas in said image.

11 9. A method as recited in claim 8, wherein the step of
12 producing a visually pleasing transition includes:

13 if said dynamic range is high,
14 computing a pixel data threshold value for said region of
15 interest;

16 comparing each pixel value in said region of interest to
17 said pixel data threshold;

18 if said pixel value is greater than the pixel data
19 threshold value, a first value is placed in the corresponding
20 position of the said second format image;

21 if said pixel value is less than or equal to the pixel
22 data threshold value, a second value is placed in the
23 corresponding position of the said second format image;

24 if said dynamic range is medium,
25 computing a desired number of second values to be placed in
26 said second format image in the region of interest;

1 ordering the pixels in the region of interest according to
2 the ordering of a predetermined halftone array;

3 altering the order of a pixel in said ordering if said
4 pixel has a value which is greater than the value of the next
5 pixel in said order by a predetermined reordering threshold
6 value;

7 repeating said altering of the pixel order until the first
8 and second values chosen for the second format image are no
9 longer changed;

10 choosing said desired number of second values for the
11 second format from the beginning of the said order, and
12 assigning the remaining pixels values in the region of interest
13 to said first value;

14 if said dynamic range is low,

15 using said predetermined halftone array to compute said
16 first and second values for said second format image;

17 if all the image intensity values in the said ROI are either
18 very high or very low, outputting all said first values or all
19 said second values to the second format image respectively.

20 10. A method as in claim 9, where we determine a number of
21 second value to be placed in said second format image based on
22 a weighted function of the image intensity values within the
23 region of interest of the first format image

24 11. A method as in 9, wherein the plurality of
25 regions-of-interest form the entire said first format image.

1 12. An article of manufacture comprising a computer usable
2 medium having computer readable program code means embodied
3 therein for causing a digital image to be transformed, the
4 computer readable program code means in said article of
5 manufacture comprising computer readable program code means for
6 causing a computer to effect the steps of claim 1.

7 13. A program storage device readable by machine, tangibly
8 embodying a program of instructions executable by the machine
9 to perform method steps for transforming a digitized image,
10 said method steps comprising the steps of claim 1.

Sub B2
11 14. A method for halftoning at least a portion of an image,
12 the method comprising employing a first rule of halftoning and
13 a second rule of halftoning.

14 15. A method as recited in claim 14, further comprising
15 employing a third rule of halftoning and a fourth rule of
16 halftoning.

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17 16. An article of manufacture comprising a computer usable
18 medium having computer readable program code means embodied
19 therein for causing halftoning at least a portion of an image,
20 the computer readable program code means in said article of
21 manufacture comprising computer readable program code means for
22 causing a computer to effect the steps of claim 14.

23 17. An article of manufacture comprising a computer usable
24 medium having computer readable program code means embodied
25 therein for causing halftoning at least a portion of an image,
26 the computer readable program code means in said article of

1 manufacture comprising computer readable program code means for
2 causing a computer ~~to~~ effect the steps of claim 15.

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